

In the Claims

1 1.(**withdrawn**) A composition comprising brine solution including an effective amount of a
2 divalent cation, at least one pollutant and having a salinity between about 3% and about 15%, where
3 the effective amount of the divalent cation is sufficient to produce a divalent to monovalent cation
4 mole ratio of at least 0.05 in the brine solution and where the brine solution is capable of supporting
5 and sustaining growth of a microbial culture capable of degrading the at least one pollutant.

1 2.(**withdrawn**) The composition of claim 1, wherein the divalent cation is selected from the
2 group consisting of Mg^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , and mixtures or combinations thereof.

1 3.(**withdrawn**) The composition of claim 1, wherein the divalent cation is selected from the
2 group consisting of Mg^{2+} , Ca^{2+} , Sr^{2+} , and mixtures or combinations thereof.

1 4.(**withdrawn**) The composition of claim 1, wherein the divalent cation is selected from the
2 group consisting of Mg^{2+} , Ca^{2+} , and mixtures or combinations thereof.

1 5.(**withdrawn**) The composition of claim 1, wherein the divalent cation is Mg^{2+} .

1 6.(**withdrawn**) A brine solution comprising a divalent to monovalent cation mole ratio of at
2 least 0.05 and having a salinity greater than or equal to about 3%, where the brine solution is capable
3 of supporting and sustaining microbial growth.

1 7.(**withdrawn**) The composition of claim 6, wherein the divalent cation is selected from the
2 group consisting of Mg^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , and mixtures or combinations thereof.

1 8.(**withdrawn**) The composition of claim 6, wherein the divalent cation is selected from the
2 group consisting of Mg^{2+} , Ca^{2+} , Sr^{2+} , and mixtures or combinations thereof.

1 9.(**withdrawn**) The composition of claim 6, wherein the divalent cation is selected from the

2 group consisting of Mg²⁺, Ca²⁺, and mixtures or combinations thereof.

1 10.(withdrawn) The composition of claim 6, wherein the divalent cation is Mg²⁺.

1 11.(withdrawn) The composition of claim 6, wherein the brine solution has a salinity between
2 about 3% and about 15%.

1 12.(withdrawn) The composition of claim 6, wherein the brine solution has a salinity between
2 about 3% and about 13%.

1 13.(withdrawn) The composition of claim 6, wherein the brine solution has a salinity between
2 about 3% and about 10%.

1 14.(currently amended) A method comprising the steps of:

2 feeding a contaminated brine solution having a salinity greater than or equal to about 3% to
3 a biological reactor containing a mixed bacterial culture capable of degrading at least one
4 contaminant under anoxic/anaerobic conditions;

5 adding an effective amount of a divalent cation precursor to the reactor, where the effective
6 amount of the divalent precursor is sufficient to maintain a divalent to monovalent cation
7 mole ratio at a numeric value greater than or equal to about 0.05,

8 degrading the contaminant in the contaminated brine solution for a time and at a temperature
9 sufficient to reduce a concentration of the contaminant at or below a desired concentration
10 while maintaining a suitable nutrient environment in the reactor and while maintaining the
11 ratio greater than or equal to about 0.05.

1 15.(original) The method of claim 14, wherein the reactor is sealed to reduce or eliminate oxygen
2 from the reactor.

1 16.(original) The method of claim 14, further comprising the step of:
2 sparging or purging the reactor with an oxygen-free gas after feeding the brine solution and

optionally during the degrading step.

17.(original) The method of claim 14, wherein the gas is selected from the group of nitrogen, argon, and mixtures and combinations thereof.

18.(original) The method of claim 14, wherein the divalent cation precursor is selected from the group consisting of a soluble Mg^{2+} salt, a soluble Ca^{2+} salt, a soluble Sr^{2+} , a soluble Ba^{2+} salt, and mixtures or combinations thereof.

19.(original) The method of claim 14, wherein the divalent cation precursor is selected from the group consisting of a soluble Mg^{2+} salt, a soluble Ca^{2+} salt, a soluble Sr^{2+} , and mixtures or combinations thereof.

20.(original) The method of claim 14, wherein the divalent cation precursor is selected from the group consisting of a soluble Mg^{2+} salt, a soluble Ca^{2+} salt, and mixtures or combinations thereof.

21. (original) The method of claim 14, wherein the divalent cation precursor is a soluble Mg^{2+} salt.

22.(original) The method of claim 14, wherein the contaminant is selected from the group consisting of perchlorate, nitrate and mixture or combinations thereof.

23.(original) The method of claim 22, wherein the nutrient environment comprises adding an inorganic energy source or an organic energy source in amounts greater than a stoichiometric amount of electrons required to reduce the perchlorate and/or nitrate present in the brine solution for sustained microbial growth during the degrading step.

24.(original) The method of claim 23, wherein the inorganic energy source is selected from the group consisting of H₂ gas, a hydrogen delivery chemical, and mixtures or combinations thereof.

25. (original) The method of claim 23, wherein the organic energy source is selected from the group

2 consisting of acetate, ethanol, methanol, lactate, and mixtures or combinations thereof.

1 26.(original) The method of claim 14, wherein the contaminated brine solution is a perchlorate
2 and/or nitrate contaminated ion-exchange regenerate brine.

1 27.(currently amended) A method comprising the steps of:

2 passing a waste water stream including at least one ion-exchangeable pollutant through an
3 ion-exchange resin able of exchanging the pollutant ion for a non-pollutant ion for a predetermined
4 time or until the resin is no longer able to exchange the pollutant ion with the non-pollutant ion;

5 stopping the waste water stream from passing through the resin;

6 passing a brine solution having a salinity greater than or equal to about 3% through the resin
7 for a time sufficient to exchange all or substantially all of the pollutant ion with the non-pollutant
8 ion to form a pollutant contaminated brine solution;

9 adding an effective amount of a divalent cation to the pollutant contaminated brine solution
10 to adjust a divalent to monovalent cation mole ratio to a numeric value greater than or equal to 0.05
11 to form a stabilized, pollutant contaminated brine solution;

12 contacting the stabilized, pollutant contaminated brine solution with an effective amount of
13 a pollutant degrading culture under anaerobic/anoxic conditions for a time and at a temperature
14 sufficient to degrade a concentration of the pollutant to or below a desired concentration to form a
15 crude treated brine solution; and

16 filtering the crude treated brine solution to remove the culture and to form a treated brine
17 solution.

1 28.(original) The method of claim 27, further comprising the step of:

2 repeating the step of claim 26, where the brine solution comprises the treated brine solution.

1 29.(currently amended) A method comprising the steps of:

2 feeding a waste water stream including at least one ion-exchangeable pollutant with a first
3 column including a first ion-exchange resin able of exchanging the pollutant ion for a non-pollutant
4 ion for a predetermined time or until the resin is no longer to exchange the pollutant ion with the

5 non-pollutant ion;

6 switching the waste water stream feeding from the first column to a second column including
7 a second ion-exchange resin capable of exchanging the pollutant ion for a non-pollutant ion for a
8 predetermined time or until the resin is no longer to exchange the pollutant ion with the non-
9 pollutant ion;

10 passing a brine solution having a salinity greater than or equal to about 3% through the first
11 column for a time sufficient to exchange all or substantially all of the pollutant ion with the non-
12 pollutant ion to form a pollutant contaminated brine solution and to regenerate the first resin;

13 adding an effective amount of a divalent cation to the pollutant contaminated brine solution
14 to adjust a divalent to monovalent cation mole ratio to a numeric value greater than or equal to 0.05
15 to form a stabilized, pollutant contaminated brine solution;

16 contacting the stabilized, pollutant contaminated brine solution with an effective amount of
17 a pollutant degrading culture under anaerobic/anoxic conditions for a time and at a temperature
18 sufficient to degrade a concentration of the pollutant to or below a desired concentration to form a
19 crude treated brine solution;

20 filtering the crude treated brine solution to remove the culture and to form a treated brine
21 solution;

22 switching the waste water stream feeding from the second column to first column; and
23 repeating the above-identified steps.

1 30. **(currently amended)** The method of claim 2729, wherein the first and second ion-exchange
2 resins are the same.